Pre-Ave Mission Update
January 31, 2004

First Science Flight, January 19, 2004

The first Pre-AVE science flight was flown from Ellington Field, Houston, Texas on January 19, 2004. The total flight time was 5 hours, 15 minutes, and the aircraft reached a maximum altitude of 60,000 feet. Most of the instruments operated successfully, but there were a few minor failures, which is normal at the start of a mission. The WB-57F crossed the jetstream, with wind speeds reported as high as115 kts over Georgia.

WB-57F Take-off, First Science Flight
(Photo credit: Mike Gaunce)

Second Science Flight, January 21, 2004

The second Pre-AVE science flight was an outstanding success. All of the instruments obtained data and the crew was able to give us nearly six hours of flight time. The flight path had a basic north-south orientation, with an initial northbound leg at 37,000 feet up into Kansas. During this leg, the WB-57F cruised through the core of the jetstream. Cirrus was observed by the backseat sensor operator during this leg. After reaching it northernmost point, the WB-57F turned southward, and ascended to maximum altitude (over 60,000 feet). The aircraft passed over the top of the jet core, and then flew over Houston into the Gulf of Mexico. Over the Gulf, the WB-57F turned northward back towards Houston, and descended to 50,000 feet. At maximum altitude, ozone values increased to over 1 ppmv. There was a very sharp gradient in ozone and a number of other trace gases which were observed as we flew northward at 50,000 feet towards Houston.

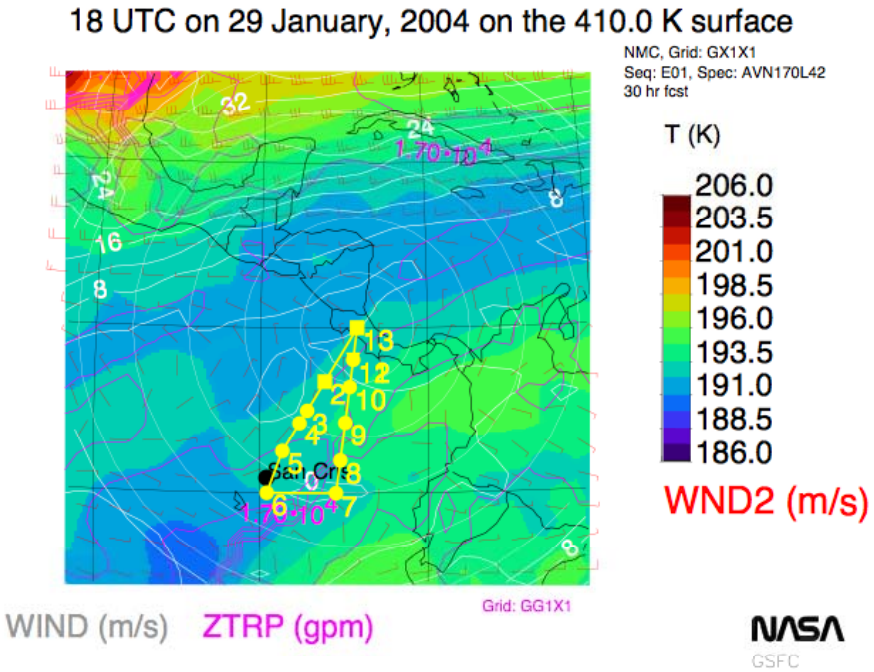
Third Science Flight, January 27, 2004

The first science flight from Costa Rica, and the third of the mission, was flown on January 27, 2004. The aircraft took off from the Juan Santamaria airport in San Jose and alternated altitudes between 48,000 feet and 58,000 feet, while flying directly south from San Jose, Costa Rica, to a latitude of 3˚ south of the equator. Thin cirrus was encountered on much of the flight. Temperatures were quite cold over the flight profile, and winds were quite light in the lower stratosphere and upper troposphere. The data suggests that the water vapor "hygropause" was located between our two flight levels, while the temperature cold point was above our flight level. The Tunable Diode Laser water vapor sonde also was flown from San Jose at 18Z today to a pressure slightly less than 6 hPa.

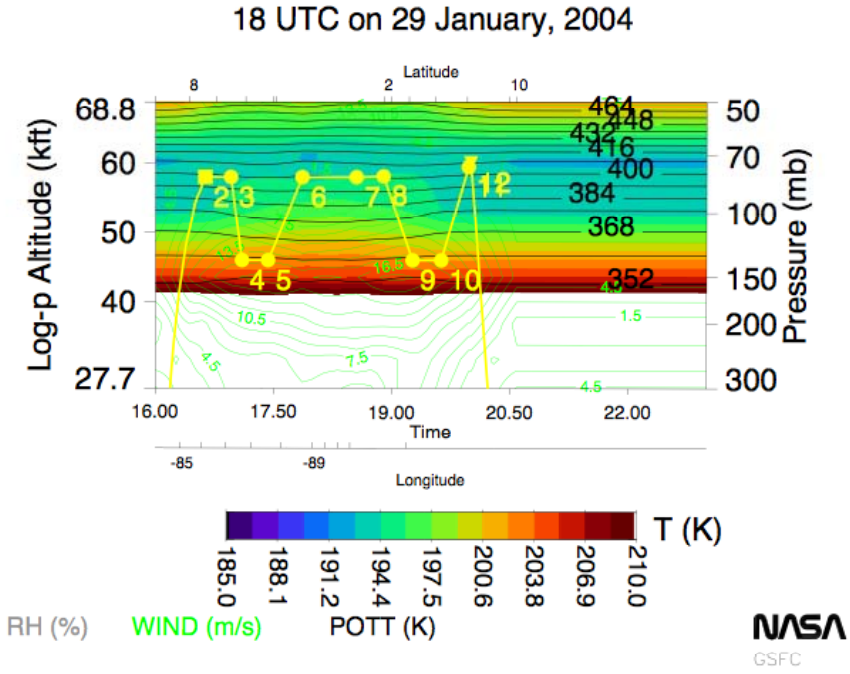
WB-57F Pre-flight Check-out, Juan Santamaria Airport
(Photo credit: Mike Gaunce)

Fourth Science Flight, January 29, 2004

The second flight in Costa Rica was a great success. The aircraft alternated altitudes between 48,000 and 58,000 feet while flying south from San Jose and then turned east at the Galapagos Islands and flew along the equator before returning north (see expected flight path and profile below). The eastbound track crossed gradients in tropopause height and temperature. Temperatures overall were cold over the flight (down to 188K), but warmer than on the first southern flight. A water sonde balloon flight from the Galapagos Islands was coordinated with the flight overpass. Based on the results from this flight, it was decided to add a fifth science flight on the following day.



Proposed flight path for fourth Science Flight (1-29-04)
Proposed flight profile for fourth Science Flight (1-29-04)



Fifth Science Flight, January 30, 2004

An additional science flight was added to the schedule, and it turned out to be the best flight of the mission, with a nearly flawless performance of the payload. The WB-57F took off at 10:00 am and ascended to 46,000 feet while flying directly to the Galapagos Islands. The plane began ascending to 58,000 feet near 4˚ N, and then ascended to about 61,000 feet over San Cristobal in the Galapagos. The plane then spiraled down to 35,000 feet just south of the equator, and then spiraled back up to 46,000 feet. The plane turned back towards San Jose, ascended to 58,000 feet near 4˚N, and then went to a maximum altitude near 62,000 before landing in San Jose at 2:43 pm.

Outside temperatures were slightly warmer than they were yesterday (Thursday, 29 January). A frostpoint balloon instrument was also flown from San Cristobal in coordination with the WB-57F flight. Subvisual cirrus was observed by the aircraft flight crew as a very narrow layer that was visible on the horizon from both sides of the aircraft (see attached photo), but was not visually observable near the aircraft.

Subvisual cirrus visible on the horizon, as seen from the WB-57F.
(Photo credit: Brian Barnett)